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FURTHER SEARCHING IN SOCIAL INTELLIGENCE

by

Eric Michael Gerdeman

**A Thesis Submitted to the Faculty of the Graduate School of
Loyola University of Chicago in Partial Fulfillment
of the Requirements for the Degree of
Master of Science**

June

1973

ACKNOWLEDGMENTS

The author wishes to offer special gratitude to Emil J. Posavac, Ph.D. who directed this study and who constantly provided welcomed and needed guidance, and to Ronald E. Walker, Ph.D who encouraged and guided this research.

LIFE

Eric Michael Gerdeman was born on 16 October, 1937 in St. Petersburg, Florida.

He entered the Order of Friars Minor, Province of the Most Holy Name in 1957. From St. Bonaventure University, St. Bonaventure, New York, he received a Bachelor of Arts degree in Philosophy in June, 1960; from Catholic University of America, Washington, D. C., a Bachelor of Sacred Theology degree in June, 1964; from Northwestern University, Evanston, Illinois, a Master of Arts degree in Public Address and Group Communication in August, 1970. The author entered the graduate program in Experimental Psychology of Loyola University of Chicago in September, 1970.

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CHAPTER I

INTRODUCTION

The concept of social intelligence at this point in psychology is founded much more in popular belief than in measurable fact. Research in the area of social intelligence from the viewpoint of individual differences may be a quixotical venture or may result in a valuable scientific refinement of an important human ability. That such an ability to understand and deal rightly with people exists is not questioned. However, exactly what this ability is and how it can be measured are the questions which delineate research. The basic problem seems evident: there is a lack of precise conceptualization and of measurement as regards what the phenomenon called "social intelligence" is (Cronbach, 1960; Gage & Cronbach, 1955).

The concept of social intelligence (hereafter referred to as SI) is traced back to E. L. Thorndike (1920), who distinguished three types of intelligence, viz., abstract, mechanical, and social. He defined SI as "...the ability to understand and manage men and women, boys and girls -- to act wisely in human relations [p. 228]." In this definition two components for SI are specified: a) a cognitive element, or "a cognitive appreciation of others without necessary action on the part of the perceiver," and b) a behavioral element, or "action-oriented coping with others [Walker & Foley, 1973, p. 6]." From this formulation of Thorndike, interest and research in the area of SI developed in different directions depending upon the subsequent writers' orientation and methodology in conducting research.

In the area of conceptualization and definition the phenomenon of understanding and dealing with people has been subsumed under various rubrics, such as empathy (Dymond, 1949; Hastorf & Bender, 1952; Hogan, 1969), social sensitivity (Bender & Hastorf, 1953; Rothenberg, 1970), social perception (Bronfenbrenner, Harding & Gallwey, 1958), interpersonal perception (Cline, 1964; Cline & Richards, 1960), interpersonal competence (Weinstein, 1969), sociability (Gilliland & Burke, 1926; Stauter & Hunting, 1933), the ability to judge people (Taft, 1955), person perception (Asch, 1946; Tagiuri, 1969), psychological ability (Wedek, 1947), social insight (Chapin, 1942; Gough, 1965, 1968), and social intelligence (Chapin, 1939; Guilford, 1967; Moss & Hunt, 1927; O'Sullivan, Guilford & deMille, 1965; Shanley, Walker & Foley, 1971). While the general area of interest is approximately the same for all of these, the methodological orientation and modes of measurement are not.

Walker and Foley (1973) have presented a history of the concept of SI and shown the separate development of the concept from an idiographic and nomothetic orientation. A much larger body of literature and research exists from the nomothetic orientation, wherein the interest is the appraisal of others and the accuracy of judgment. The method of measurement employed is usually some form of a rating scale. However, the present interest in research in the area of SI concerns the question of individual differences rather than the judgment of the other as a general process (Futterer, 1973; Gough, 1965; Guilford, 1968; Guilford & Hoepfner, 1971; Hoepfner & O'Sullivan, 1968; O'Sullivan, et al., 1965; Shanley, et al., 1971; Tenopyr, 1967; Walker & Foley, 1973). Perhaps

the earlier emphasis on general processes was a useful course of development in order to first clarify to some degree the presence and operation of the processes which hold generally before broaching the area of individual differences.

A different conceptual framework for understanding and measuring SI can be found in the theory and research on cognitive development. Utilizing Piaget's concept of decentering, Feffer, Flavell and their associates have proposed that for interpersonal and effective communication a person must be able to achieve balanced decentering or to shift his focus to the viewpoint of another. The requisite cognitive organization for such decentering can be measured by the role-taking ability of a person. Feffer (Feffer, 1959; Feffer & Suchotliff, 1966) has presented the Role-Taking Test (RTT) as a measure of such ability. This approach of concentrating on a person's ability to decenter and of using the RTT has been used recently as a means of investigating and measuring SI (Futterer, 1973).

The concept of SI as a distinct ability or type of intelligence is repudiated by some authors. Glasser and Zimmerman (1967), Matarazzo (1972) and Wechsler (1958) accept the term SI but not the entity for they claim that "SI is just general intelligence applied to social situations [Wechsler, 1958, p. 75]." They hold that the subtest "Picture Arrangement of the WAIS and WISC is a measure of "so-called SI."

Besides the problem of definition and orientation, another area that has to be dealt with is the problem of the measurement of SI and the question of construct validity. The tests that have been devised to

measure or test SI (Chapin, 1942; Kerr & Speroff, 1947; Moss, Hunt, Omwake & Ronning, 1927; O'Sullivan & Guilford, 1966; Sargent, 1953) have been found either to be invalid (Anastasi, 1968; Cronbach, 1960; Thorndike & Stein, 1937; Woodrow, 1939) or to be of questionable value pending further research (Cronbach, 1970; Gough, 1965; Shanley, et al., 1971; Tenopir, 1967; Walker & Foley, 1973). The major criticism against these tests of SI is that they do not measure an ability or trait which is distinct from verbal intelligence as measured by an abstract intelligence test. Research to this point has shown a consistent and positive significant correlation between AI and SI. Furthermore, there is a growing discontentment with and a questioning of the usefulness of measuring relational personality variables by static, pencil-and-paper and predominantly verbal types of measurement (Block, 1968; Cattell, 1971; McHenry, 1971; Mischel, 1968; Sarason & Smith, 1971; Secord & Backman, 1965; Thorndike & Stein, 1937).

The purpose of this paper is to investigate this area of measurement and to explore the question whether two of the current tests of SI, viz., the Chapin Social Insight Test (Chapin, 1967) and the Six Factor Tests of Social Intelligence, developed by O'Sullivan and Guilford (1966), tap an ability that is separate from abstract intelligence. In essence, the question posed is: Do these two tests of SI measure the construct for which they were designed?

CHAPTER II

REVIEW OF RELATED LITERATURE

In order to provide the proper framework for this study, a summary of the concept, the development, and the measurement of SI as related to these two measures is presented.

The Chapin Social Insight Test (CSIT)

Chapin (1939), working in the field of sociology, maintained a strict separation between the cognitive and the behavioral components of SI. Because of this he questioned the definition and the measure of SI used in the 1930's and proposed his own definition and tests. In 1939 he made a distinction between social intelligence and social insight, as distinction which paralleled Thorndike's two components of SI. He defined social intelligence in terms of social participation and social adjustment -- the action component from Thorndike -- so that the measure of SI was "...both the extensivity and the intensity of social participation in group activities... [p. 157]." To measure this concept of social intelligence he presented the Social Participation Scale. At the same time, he proposed that social intelligence, which for him represented an action-oriented concept, was a form of social insight. Social insight, then, represented the cognitive or understanding element of this phenomenon. In 1942 he defined social insight as: "...the ability to recognize in principle in a given situation: 1) the existence and operation of specific substitute responses...; and 2) the need of some specific stimulus to adjust group conflicts or tensions... [p.214]."

In this 1942 article he also presented the preliminary standardization and form of the Social Insight Test (CSIT), which was devised specifically to measure the understanding or cognitive aspect of SI. Thus, Chapin through both articles maintained that social insight, a diagnostic ability, was an ability separate from social intelligence, a behavioral tendency of the individual. He criticized the definition of SI proposed by Moss and Hunt (1927), viz., "the ability to get along with people," and their measure of SI, the George Washington Social Intelligence Test, because they equated the two abilities. Both of Chapin's tests, the Social Participation and the Social Insight Test, were not employed in subsequent research because of the lack of interest in SI at the time and probably because Chapin published in sociological journals (Walker & Foley, 1973). However, interest in the CSIT as a possible instrument for measuring SI was revived by Gough (1965).

The CSIT consists of 25 statements concerning social situations with alternative explanations. The materials for the construction of the test were taken from case histories, problem novels, and items from existing measures of social attitudes and intelligence. The person taking the test is directed to read each statement which describes a social situation and to mark one of the alternative explanations which are given. Social insight is defined in the test as "...the ability to 'see into' social situations that involve individual needs to avoid embarrassment or to achieve some satisfaction as an offset to some frustration [Chapin, 1942, p. 220]." The sample item given at the

beginning of the test reads:

Mr. Asher, when told that an acquaintance had purchased a new automobile, was heard to criticize him very strongly for spending so much money for a car when he probably could not afford to buy one. Not long after this incident, Mr. Asher himself bought an expensive new automobile. About the same time, he placed another mortgage on his house. Why did Mr. Asher criticize his acquaintance for an act he afterwards performed himself?

- a. Because he probably had "money left to him" upon the death of a near relative.
- b. Criticism of his acquaintance got rid of an "uneasy feeling" about something he contemplated doing himself.
- c. His acquaintance was probably an unsafe driver.
- d. In sections of the country long settled and in which Mr. Asher lived, most houses were heavily mortgaged. [p. 220]

The "most appropriate, intelligent, or logical" choice would be "b." For Chapin this choice depends upon "...the ability to define (i.e., by classifying, diagnosing, inferring causes, or predicting) a given social situation in terms of the behavior imputed to others present, rather than in terms of the individual's own feelings about the others [p. 215]."

Research Literature

The major research concerning the CSIT has been done by Chapin (1942) and Gough (1965, 1968), and in general has shown adequate reliability and promising validity. Chapin (1942) found low correlations in his initial validity tests for the original form of 45 items; however, through item analysis he reduced the original form to 25 items which showed significant correlations and high group differentiating power. The significant relationships found between scores on the CSIT and a) the ranking of persons in social agencies or other occupational groups regarded as possessing "more than the average degree of social insight" (Chapin, 1942; Gough, 1965), b) the ratings on other variables, such as creativity of

personnel (McDermid, 1965), and c) personality differences between clients who continue or drop out of counseling (Heilbrun, 1965), add to the validation evidence. Gough (1965) has also reported promising findings, but without cross-validation data, for the relationships between the CSIT and "creative originality" and academic progress or "survival."

Gough began his research in order to evaluate the usefulness of the Chapin scale for measuring SI. He believes that his data are only a start but that the CSIT is worthy of attention in psychological research, and hopes that significant studies will be forthcoming. At present, however, studies using the CSIT have not been forthcoming and this scale has been little used in research on SI. In the standard texts on psychological testing, Cronbach (1970) makes no reference to the CSIT, and Anastasi (1968) only mentions it in an appendix which lists miscellaneous personality tests.

Turning to the central issue of the relationship between social intelligence and abstract intelligence, the research data are very sparse -- Gough offers the only published evidence between the CSIT and abstract intelligence (measured by seven intellectual and cognitive measures), but the magnitude of this relationship was modest -- the coefficients range between .24 and .40. In a 1955 study Gough found a coefficient of .47 between the CSIT and the Terman Concept Mastery Test, but in his 1965 study he found a coefficient of .36 between the same two tests. Given the fact that the reliabilities of both tests are not perfect, the reported correlation between them will necessarily

underestimate the true correlation. Although the magnitude of the correlation is lower, this specific area of the relationship between CSIT and abstract intelligence demands further research before the validity of the CSIT can be definitively established.

Six Factor Tests of Social Intelligence (SFTSI)

The Six Factor Tests of Social Intelligence (SFTSI) has been used more extensively in research on SI than the CSIT and with more promising results. The SFTSI, published by O'Sullivan, et al. (1965), is based upon Guilford's "structure of the intellect" (SOI) model. In this conceptualization, social intelligence is viewed as comprised of a group of intellectual abilities -- 30 different social or behavioral intelligence factors. The entire SOI model is made up of 120 separate intellectual abilities, arrived at by the possible combinations of the three dimensions of the model: 1) the operation dimension with the five different activities of cognition, memory, divergent production, convergent production, and evaluation; 2) the content dimension with the four areas of semantic, symbolic, figural, and behavioral; and 3) the product dimension with the six categories of units, classes, relations, systems, transformations, and implications. A given intellectual act, thus, can be classified into a cell of the model, labeled with three letters specifying the operation, the content, and product required for that act, or according to how it operates, what it operates on, and what is produced by the operation.

Restricting attention to the 30 factors encompassing SI, the first phase of the study on SI (O'Sullivan, et al., 1965) dealt only with the

six factors of behavioral cognition: 1) cognition of behavioral units (CBU), 2) classes (CBC), 3) relations (CBR), 4) systems (CBS), 5) transformations (CBT), and 6) implications (CBI). The remaining four intellectual operations hypothesized in Guilford's SOI model, namely, behavioral memory, convergent production, divergent production, and behavioral evaluation, were left for later research. Thus far, only creative social intelligence or the six behavioral divergent abilities have been investigated (Hendricks, Guilford & Hoepfner, 1969).

O'Sullivan, et al. (1965) defined behavioral cognition as "...the ability to understand the thoughts, feelings, and intentions of other people as manifested in discernible, expressional cues [p. 6]." From their analysis of 23 possible behavioral cognition tests, six tests were selected; these tests actually measure only four of the six factors hypothesized as comprising behavioral cognition (listed above). These tests, which constitute the SFTSI, are: 1) Cartoon Prediction (measuring CBI), 2) Expression Grouping (CBC), 3) Missing Cartoons (CBS), 4) Missing Pictures (CBS), 5) Picture Exchange (CBT), and 6) Social Translations (CBT).

Research Literature

The major research on the SFTSI has been done by Guilford and/or his associates (Hoepfner & O'Sullivan, 1968; O'Sullivan & Guilford, 1966; O'Sullivan, et al., 1965). They have established the reliability and construct validity of the SFTSI, and through factor analysis they have determined the factor loadings for the abilities investigated. Tenopyr (1967) offered further evidence for construct validity through his

findings that the behavioral cognition tests yielded a moderate level of prediction of academic success. However, he called for additional efforts to strengthen the empirical support for construct validity.

The question of the relationship between SFTSI and abstract intelligence is far from settled. O'Sullivan, et al. (1965) stated quite definitely that the tests adequately differentiate SI from general intelligence:

Verbal comprehension, factor CMU, is widely regarded as the major component of the traditional concept of general intelligence. Of the 24 behavioral-cognition tests, only one is loaded higher than .15 on this factor. There is little doubt that whatever the behavioral tests measure it is not general intelligence [p. 28].

However, the magnitude of the relationship between the SFTSI and IQ (Henmon-Nelson) ranges in the .30s and .40s. Hoepfner and O'Sullivan (1968) found similar coefficient ranges, and also found that those who scored high in IQ tended also to have high scores on SI. Shanley, et al. (1971) found significant correlations between the SFTSI and the Otis IQ scores, and called into question the contention of O'Sullivan, et al. that the tests do not simply measure general intelligence. The correlations reported by Futterer (1973) between the Terman Concept Mastery Test and four of the SFTSI give further evidence for such questioning. The correlations between AI and three of the SFTSI as well as the composite of the four were significant.

While Guilford and his associates have done a vast amount of research on the SOI model in general, for the SI tests specifically what is lacking is research in the area of the relationship between these tests and general or abstract intelligence. Nevertheless, these tests,

although of recent construction and in need of further validation studies, seem to be the most promising instrument for measuring SI.

Cronbach in 1960 was quite skeptical about the measurement of SI:

After fifty years of intermittent investigation.... social intelligence remains undefined and unmeasured....No evidence of validity is yet available which warrants confidence in any present technique for measuring a person's ability to judge others as individuals [p. 319-320].

In 1970, however, he found promise in Guilford's proposal and evidence for the measurement of a category of SI -- CBR (cognition of behavioral relations).

Further Investigation

The phenomenon of SI has interested, yet its measurement has eluded, psychologists for years. On the basis of the research reviewed concerning the relationship between SI and AI, it is expected that the scores on the SI tests will correlate significantly with the scores on the AI test. This will add further confirmation to the evidence that the present tests of SI do not differentiate SI from AI as adequately as would be desired. Possibly, for an adequate instrument to evaluate SI a new measurement which goes beyond the pencil-and-paper type test has to be devised, as has been suggested by several investigators (Cattell, 1971; McHenry, 1971; Thorndike & Stein, 1937). Possibly, because of the separation of SI into two components, too much concentration has been placed on measuring just the cognitive aspect with the assumption that such a score will accurately predict behavior. In the area of person perception, several investigators (Block, 1968; Cline, 1964; Cline & Richards, 1960; Mischel, 1968; Sarason & Smith, 1971;

Secord & Backman, 1965) have argued that cognition is not enough and have emphasized the importance of the "context" in which behavior occurs or the situational factors. Possibly, what should be done first is to re-examine the concept of SI to determine what elements are involved, and to define the construct more precisely which would facilitate test construction (Cattell, 1971; Walker & Foley, 1973).

The work of R. B. Cattell offers a possible avenue of investigation and clarification. Through factor analysis Cattell has investigated the areas of abilities and personality. Calling upon both areas he has suggested a possible explanation for the development and measurement of SI, although he has not fully developed this topic. He recognizes that SI has usually vanished when general intelligence has been partialled out. Nevertheless, he suspects that SI is a major primary ability and may be found if SI skills are measured effectively.

For him, an ability is "shaped" or can be accounted for by the interaction of several factors, the most important of which are the individual's congenital abilities, interests, temperament, motivation, reward and learning experiences. All of these factors can be subsumed under three major categories: a) unitary ability traits (A); b) personality-temperament traits (P); and c) motivation (D), or as Cattell put it: "...ability structure, at a given moment, is child both of previous ability structure and of temperament and motivation [p. 333]."

Considering only the relationship of Cattell's proposal to SI, he classified SI as a "proficiency," which is shaped by the interaction of previous ability structure and personality-temperament endowment, bound

together into an ability pattern by a common reward experience. The specific personality-temperament endowment that he hypothesized that was related to SI was extraversion, which he labeled "F factor."

Cattell reasoned that "...a high surgency (F factor) favoring much social interaction when in groups might develop a pattern of social skills in a surgent individual, such as the 'social intelligence' conceived by Thorndike [p. 337]."

SI, then, is not an ability totally separate from AI, but rather is the result of the interaction of AI with other factors, in particular the personality trait of extraversion. The correlation found consistently between SI and AI is to be expected and necessary. Thus, it may be the case that given the proper reward experience a person with high AI and high F would develop high SI; that a person with high AI but low F, and also a person with low AI but high F would have high SI because such people would be able to compensate for their weaknesses. However, a person with low AI and low F would have low SI because compensation would be unlikely regardless of reward patterns. Cattell's theorizing does offer a possibility for explaining and predicting SI which is worthy of investigation. If this relationship were supported, it would fit in well with the typical finding of a positive relationship between SI and AI.

Hypotheses

Based on the research findings concerning the relationship between SI and AI, it is hypothesized that scores on both the SI tests, the CSIT and the SFTSI, will correlate significantly with scores on the AI test,

as measured by the Terman Concept Mastery Test. While the SFTSI has been employed more frequently than the CSIT in research on the relationship between SI and AI, from the research reviewed and because of the totally verbal nature of the CSIT, it is further expected that the scores on the CSIT will show a slightly higher correlation with AI than the scores from the SFTSI.

In order to investigate Cattell's proposal for the "shaping" of SI, it is hypothesized that there will be a positive correlation between SI scores and the interaction of the scores on the AI test and the "F factor" as measured by the Maudsley Personality Inventory, as well as between SI and AI. It may be that SI and F will also correlate positively.

Finally, a factor analysis will be performed on all these variables plus a number of additional variables, which will constitute the "hyperplane fodder" called for by Cattell for an adequate factor analysis. Cattell (1952, 1966) required that a sufficient number of variables not directly related to the main factors in which one is interested be included in order to provide good "hyperplane fodder." These variables which show low correlations with the main factors create the proper hyperplane so that the reference vector more clearly stands out perpendicular to it. Both the reference vector and the hyperplane are necessary and form the figure and the ground for the proper perception of factor positions.

CHAPTER III

METHOD

Subjects

The subjects participating in this study were 45 male and 30 female undergraduate students enrolled in the introductory psychology classes at Loyola University of Chicago. Participation in experiments conducted by the Department of Psychology was a requirement of the introductory course. The subjects were told the nature and purpose of the experiment before taking the tests, and were sent the results afterwards.

Test Materials and Procedure

All subjects were given a series of five tests administered by the author. The measures were administered in a group form over two testing periods of two hours each to groups of approximately 30 to 40 subjects per testing period. All tests were administered and scored as specified in their respective manuals.

Each subject was tested on the Terman Concept Mastery Test (Form T) (Terman, 1950) as a measure of AI or verbal intelligence. Fifteen minutes were allotted for each of the two parts of the test.

SI was measured by the Chapin Social Insight Test (Chapin, 1967), and four of the SFTSI tests developed and recommended by O'Sullivan, et al. (1965) as the best composite for measuring SI. The four SFTSI tests were: Social Translations, Expression Grouping, Missing Cartoons, and Cartoon Predictions. According to the SOI model, these tests tapped cognition of behavioral transformations, classes, systems, and implications, respectively.

The Maudsley Personality Inventory (Eysenck, 1962) was used as a measure of extraversion or the "F factor" to investigate Cattell's proposal. A measure of neuroticism was also taken from this instrument to be included in the factor analysis.

In order to provide the "hyperplane fodder" required by Cattell (1952, 1966) for an adequate factor analysis, a number of additional variables were gathered. Included were personality variables, which might be related to some degree with SI, and demographic variables, which would show low correlations with SI. The Personal Orientation Inventory (Shostrom, 1966) was given as a measure of general personal development and interpersonal interaction. Only the four basic independent scales of personal orientation, namely the Time scales and the Support scales, were selected for the analysis. The Time scales indicate the degree to which a person is either time competent (T_c), i.e., lives primarily in the present with "full awareness, contact and full feeling reactivity," or time incompetent (T_i), i.e., lives primarily in the past with guilts and regrets and/or in the future with unrealistic goals and expectations. The Support scales measure the degree to which a person's mode of reaction is either self or inner-directed (I), i.e., guided primarily by internalized principles, or other-directed (O), i.e., influenced primarily by peer groups or other external forces. These four scales might measure variables related to SI.

The other "hyperplane fodder" gathered for the factor analytic aspect of the study included the demographic variables of age, sex,

height, and weight. Finally, each person was rated on physical attractiveness. Physical attractiveness was assessed by the author and another male graduate student at the first testing session. A 7-point rating scale was used with 1 as very unattractive and 7 as very attractive.

CHAPTER IV

RESULTS AND DISCUSSION

Descriptive Statistics

The means and standard deviations obtained by the sample ($N = 75$) on the 18 variables are shown in Table 1. (For the interested reader, the means and standard deviations for male and female subjects separately on the ability and personality variables are presented in Appendix I.) Variables 1 - 6, the demographic factors unrelated directly to SI, constitute the "hyperplane fodder" for the factor analysis. Variables 7 - 11 are the two tests of SI: Chapin Social Insight Test (variable 7), and the four measures of the SFTSI (variables 8 - 11). Variable 12 is the measure of AI, the total score on the Terman Concept Mastery Test. Variables 13 and 14 are the two scales of extraversion and neuroticism (respectively) of the Maudsley Personality Inventory. Variables 15 - 18 give the basic scales of the Personal Orientation Inventory: the Time scales of time incompetent (variable 15) and time competent (variable 16), and the Support scales of other-directed (variable 17) and inner-directed (variable 18).

The means and standard deviations for the ability and personality variables (variables 7 - 18) were within the normal range of the scores reported in the validation studies of each test, except for the Terman Concept Mastery Test. The scores obtained by the sample in this study on the Terman Concept Mastery Test were considerably lower; this point will be discussed in a later section.

The intercorrelations for the 18 variables are presented in the

Table 1

List of Variables with their Means and Standard Deviations (N = 75)

Variables	M	SD
1. Age	18.24	.75
2. Sex (coded: 1 = male, 2 = female)	-	-
3. Height (ft.)	5.66	.31
4. Weight (lbs.)	147.47	28.07
5. Physical Attractiveness - A *	4.45	1.37
6. Physical Attractiveness - B *	4.35	1.21
7. Chapin Social Insight Test	20.04	5.25
8. Social Translations	18.28	2.47
9. Cartoon Predictions	24.05	2.67
10. Missing Cartoons	18.50	4.10
11. Expression Grouping	19.38	3.00
12. Terman Concept Mastery Test	48.35	24.57
13. Maudsley Personality Inventory - Extraversion	29.33	8.95
14. Maudsley Personality Inventory - Neuroticism	25.66	9.78
15. POI - Time Incompetent	6.56	3.07
16. POI - Time Competent	15.96	3.14
17. POI - Other-Directed	42.11	9.94
18. POI - Inner-Directed	81.87	9.41

* ratings by two different experimenters.

correlation matrix in Table 2. All of the correlations are Pearson product-moment correlations. In general, the majority of the correlations were small and not significant. As was expected, there were several very or moderately high correlations, found principally between variables closely associated or opposed: the POI scales among themselves, the four SFTSI tests among themselves, .75 between height and weight, $-.76$ between sex and height, and $-.74$ between sex and weight. Moderate but significant correlations were found between the measures of AI and SI.

Examination of the results in Table 2 showed that the correlations between AI (Terman Concept Mastery Test) and four of the SI measures, namely, the CSIT, Social Translations, Cartoon Predictions, and Missing Cartoons, were significant at the .05 level. The only SI measure which showed no significant correlation with AI was Expression Grouping. The composite of the four SFTSI yielded a $\underline{r} = .34$ which was significant at the .01 level.

These findings are in accord with the majority of studies which have found small to moderate significant correlations between AI and SI as measured by similar tests. Between the CSIT and the Terman Concept Mastery Test, Gough (1965) found for two samples (total $N = 145$ males) a median \underline{r} of .36. The correlations between the four Guilford measures as well as the composite and the Terman Concept Mastery Test were within the same range as those found by Shanley, et al. (1971) and Futterer (1973). However, in this study there was a reversal on two of the measures. For Expression Grouping, Futterer found a significant

Table 2

Intercorrelation Matrix of the Variables

Variables	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Age	-15	13	12	-04	-02	-13	-25	-29	-12	-01	-22	08	-01	-11	15	-05	13
2. Sex		-76	-74	-07	-08	09	33	13	03	06	02	06	-01	-33	26	-15	03
3. Height			75	-02	-07	-08	-25	-15	-10	-07	05	-11	-03	21	-12	07	06
4. Weight				-08	-09	04	-33	-02	-08	-02	-03	-05	01	16	-11	07	01
5. Attractiveness - A					58	-09	18	01	-07	-08	-03	-04	-07	-22	22	-25	25
6. Attractiveness - B						06	08	-04	-01	-04	-08	-04	03	-09	05	-34	27
7. Chapin Social Insight Test							17	33	21	16	26	11	-18	-15	22	-10	22
8. Social Translations								30	27	10	22	05	-12	-22	23	-16	11
9. Cartoon Predictions									43	40	31	001	-07	-12	12	-14	12
10. Missing Cartoons										48	37	-11	-02	04	01	01	05
11. Expression Grouping											04	-03	04	-02	10	03	06
12. Concept Mastery Test												-29	07	09	-01	04	06
13. Maudsley - Extraversion													-32	-28	27	-26	33
14. Maudsley - Neuroticism														41	-49	02	-14
15. POI - Time Incompetent															-93	56	-52
16. POI - Time Competent																-43	59
17. POI - Other-Directed																	-81
18. POI - Inner-Directed																	

Note: - Decimal points have been omitted. With $df = 73$ the following correlation coefficient are significant: $\underline{r} = .19$ ($p < .05$), $\underline{r} = .26$ ($p < .01$), $\underline{r} = .35$ ($p < .001$).

\underline{r} (.30), this study did not ($\underline{r} = .04$), and for Cartoon Predictions, this study found a significant \underline{r} (.31), Futterer did not ($\underline{r} = .14$). Shanley, et al. also found a nonsignificant \underline{r} (.15) for Expression Grouping with the Otis IQ for 12th graders. Thus, the correlational data of this study seemed to confirm the conclusion that neither SI tests measures an ability which is separate from or independent of verbal intelligence. The construct validity of these two measures of SI is, therefore, again called into question.

A slightly higher correlation with AI was found for the SFTSI (.34 for the composite, as well as for two of the individual tests, viz., .31 for Cartoon Predictions, and .37 for Missing Cartoons) than for the CSIT (.26). This finding was not expected for it was hypothesized that the CSIT would show a slightly higher correlation with AI than the SFTSI because of the totally verbal content of the CSIT. However, the present differences were not significant, so little in the way of conclusions can be drawn except to say that the Chapin test does not correlate higher than the Guilford tests.

The possibility that the difference between the \underline{r} s might be explained in terms of the difference between the original reliabilities of the tests was examined through correction for unreliability (Magnusson, 1967). Each coefficient contains errors which result from the unreliability of the two tests themselves, and the relative magnitude of the coefficients might be explained in terms of how unreliable the tests were. The estimated coefficient for the correlation between the true scores for the variables was obtained by using the

correction for attenuation. The equation, $r_{AB} = r_{ab} / \sqrt{r_{aa} r_{bb}}$, was used, where r_{AB} is the estimated coefficient between the true scores for the variables (A) Terman Concept Mastery Test and (B) CSIT or the composite SFTSI, and r_{ab} is the obtained coefficient. The reliability coefficient for the Terman Concept Mastery Test (Forms A and T) for Air Force Captains is .86. The reported reliability coefficient (odd-even) for the CSIT is .78. The computed reliability coefficient for the four SFTSI measures is .92. The obtained coefficient between the Terman Concept Mastery Test and the CSIT was .26; between the Terman and the composite SFTSI was .34. With the correction for attenuation, the correlation between the true scores of the Terman and the CSIT is .32; between the Terman and the composite SFTSI is .38. The ratio between the obtained coefficients is .76, and between the corrected coefficients is .84. Therefore, this correction for unreliability did not serve as an explanation for the difference between the r s. Thus, the correlational data between the Terman Concept Mastery Test and the measures of SI may indicate that the SFTSI was measuring a more verbal intelligence than the CSIT.

Factor Analysis

The initial correlation matrix given in Table 2 was submitted to a principal-component analysis. The program extracted six principal components with eigenvalues above 1.00, accounting for 70.7% of the total variance. Next a factor analysis was performed on the correlation matrix with squared multiple correlations in the diagonal before iteration to improve these estimated communalities. Six factors were extracted and

were then rotated using an oblique rotation. Table 3 contains the rotated factor loadings which exceeded .30. The intercorrelations of the six factors are included in Table 4. These results indicated that six fairly distinct factors emerged. Extraversion as measured by the Maudsley Personality Inventory was the only variable that did not load above .30 on any of the factors.

Factor I was identified as an adjustment factor for it was defined positively by POI-Time Competent and negatively by POI-Time Incompetent and Maudsley Personality Inventory-Neuroticism. The loadings on this factor were very high. Factor II appeared to be a sex factor with sex, height and weight defining the poles. Male, greater height and weight formed the positive pole, and female, lesser height and weight the negative pole. Factor III seemed to be an intelligence factor with abstract intelligence loading heavier than the SI measures. The CSIT and three of the SFTSI, namely, Social Translations, Missing Cartoons, and Cartoon Predictions, had loadings above .30; Expression Grouping showed a loading on this factor of only .17. Chronological age had a loading of .41 at the opposite pole, indicating that the younger the subject, the higher the intelligence, both abstract and social. Futterer (1973) found a similar relationship between chronological age and "a creativity or flexibility of thinking factor." Factor IV was labelled as a physical attractiveness factor with both ratings of physical attractiveness defining the positive pole. Factor V was an inner- vs. other-directedness factor with POI-other-directedness forming the positive pole and POI-inner-directedness the negative pole.

Table 3

Obtained Factor Loadings of .30 or Larger

Variables	Factors					
	I	II	III	IV	V	VI
1. Age	-	-	.41	-	-	-
2. Sex	-	-.89	-	-	-	-
3. Height	-	.88	-	-	-	-
4. Weight	-	.85	-	-	-	-
5. Attractiveness - A	-	-	-	.97	-	-
6. Attractiveness - B	-	-	-	.59	-	-
7. Chapin - CSIT	-	-	-.35	-	-	-
8. Social Translations	-	-	-.38	-	-	-
9. Cartoon Predictions	-	-	-.47	-	-	-.33
10. Missing Cartoons	-	-	-.35	-	-	-.49
11. Expression Grouping	-	-	-	-	-	-.94
12. Concept Mastery Test	-	-	-.69	-	-	-
13. Maudsley - Extraversion	-	-	-	-	-	-
14. Maudsley - Neuroticism	-.65	-	-	-	-	-
15. POI - Time Incompetent	-.70	-	-	-	-	-
16. POI - Time Competent	.85	-	-	-	-	-
17. POI - Other-Directed	-	-	-	-	.96	-
18. POI - Inner-Directed	-	-	-	-	-.82	-

Table 4

Factor Intercorrelations

	Factor	II	III	IV	V	VI
Factor I		-.13	-.01	-.03	-.38	-.09
Factor II			.14	-.09	.08	.07
Factor III				-.04	-.02	.31
Factor IV					-.16	.07
Factor V						.11

These were the highest loadings obtained. Finally, Factor VI seemed to be Expression Grouping or a possible social intelligence factor. This single test of the SFTSI did not load on Factor III with the other SFTSI measures, but emerged here as a separate factor. Two other SFTSI measures, namely, Missing Cartoons and Cartoon Predictions, loaded or clustered with Expression Grouping. The other Guilford measure, Social Translations, loaded only $-.05$ on this factor. A possible explanation for the clustering on this factor might be the test format of the measures. The three Guilford measures that loaded on this Factor VI are of a similar pictorial format, whereas Social Translations has a printed verbal format.

Moderate correlations are found between Factors I and V, and between Factors III and VI (Table 4). In each case the two factors seem to be defining a somewhat similar area. Factors I and V are both defined principally by different scales of the POI, the Time and the Support scales respectively. A negative correlation between the factors would be expected since Factor I has time-competent as the positive pole and time-incompetent as the negative pole, whereas Factor V has other-directed as the positive pole and inner-directed as the negative pole. A time-competent person is also inner-directed; a time-incompetent person is ruled principally by others or is other-directed. As defined by their respective poles, a negative correlation would be expected on these two factors. Thus, Factors I and V seem to be defining two different aspects of a person's orientation, and hence load as separate factors which are negatively correlated.

Factors III and VI show a positive correlation. Factor III is the more general area of intelligence with abstract and social intelligence defining the same pole. Factor VI seems to be a differentiation within the SFTSI measures of test format, since the three SFTSI measures that loaded significantly were all of a pictorial format. The variables which have a totally verbal format, namely, Social Translations, CSIT and Terman Concept Mastery test, showed very low loadings on this Factor VI. The positive correlation between III and VI seems to indicate that a somewhat similar area was being defined, but the fact that a pictorial format emerged as a separate factor indicates that the difference in the test format might well be an important consideration in constructing measures of SI.

Thus, the intercorrelations indicated that there were at least four distinct factors which best summarized the clustering of variables, namely, an adjustment-personal orientation factor, a sex factor, an abstract and social intelligence factor with a related pictorial format factor, and a physical attractiveness factor.

The emergence of a verbal intelligence factor and a social intelligence factor as two fairly distinct factors but not totally separated from one another is in agreement with the factor analytic findings of other studies. Futterer (1973), using the Concept Mastery Test as a measure of AI, found a verbal intelligence factor on which Social Translations and Missing Cartoons of the SFTSI test also loaded above .30. With the Wechsler Adult Intelligence Scale as the measure of AI, Pavlou (1973) found a verbal intelligence factor and a social

intelligence factor. However, Social Translations and Missing Cartoons of the SFTSI tests loaded with the verbal intelligence factor, and Picture Arrangement and Digit Symbol of the WAIS loaded with the social intelligence factor.

Multiple Regression Analysis

The correlational and factor analytic techniques and results reported in the previous sections indicate the linear relationship among the variables, but these techniques do not analyze possible interactions that might be found between the variables which could account for SI. The research reviewed has shown that SI correlates significantly with AI so that SI is not a separate function from AI, and that SI does not cluster as a totally separate factor by itself but also clusters with AI as an intelligence factor. It was hypothesized, following Cattell's proposal, that SI is partially accounted for by the interaction between AI and extraversion (F factor). In order to investigate the possible configural make-up of SI, the hypothesized interaction, a multiple linear regression technique was employed.

The scores for the two variables, Terman Concept Mastery Test and Maudsley Personality Inventory - Extraversion, were converted into z scores. These two z scores as well as the calculated score for the interaction between these z scores were entered into the regression equation as possible predictor variables. Taking SI as the criterion variable and AI, F, and the interaction between AI and F (AI x F) as the predictor variables, the weighting coefficients for the predictor variables were determined from the data. The model of the regression

equation used was: $SI' = B_1AI + B_2F + B_3 (AI \times F) + C$. If, as postulated by Cattell, the interaction between AI and extraversion (F) is important in the possession of SI, the B_3 will be positive and achieve significance.

Stepwise multiple regression was used in which the variable with the largest correlation with SI was entered into the equation first. The weighting coefficient for this variable was calculated from the data. The residual of SI, i.e., the amount of variability in SI not accounted for by this first variable, was then determined. Next, the variable with the largest correlation with the residual of SI was entered into the equation along with the first variable. The weighting coefficients for these two variables was calculated from the data. This cyclic operation was repeated until the tolerance level was insufficient for further computation. This pattern was conducted twice, once for each of the measures of SI, i.e., SI as measured by the sum of the Guilford SFTSI (SI_G'), and SI as measured by the CSIT (SI_C').

With SI_G' as the criterion or dependent variable, multiple regression indicated that the best predictor variable was AI because only the weighting coefficient (B_1) for AI achieved significance. The equation yielded was $SI_G' = 3.001 AI + 80.217$. The weight of 3.001 with the standard error of .966 was significant at the .001 level of error (one-tailed). The weight for extraversion (F) was .502 with the standard error of 1.013, and that for the interaction (AI x F) was .189 with the standard error of .969. Obviously neither of these variables even approached significance. The multiple R squared for the AI variable showed that .1168 of the variability in SI_G' was

accounted for by AI; the multiple R squared for the other two variables added nothing significantly to AI in accounting for SI_C .

With SI_C as the dependent or criterion variable, multiple regression indicated that the significant predictor variables were AI and the interaction of AI and extraversion ($AI \times F$). The equation yielded was $SI_C' = 1.478 AI + 1.087 (AI \times F) + 20.348$. The coefficient (B_1) for AI of 1.478 with the standard error of .584 and the coefficient (B_3) for the interaction ($AI \times F$) of 1.087 with the standard error of .567 were both significant at the .05 level of error (one-tailed). The weighting coefficient (B_2) for extraversion (F) was not significant. The multiple R squared indicated that .1140 of the variability in SI_C was best accounted for by AI (.067) and $AI \times F$ (.047).

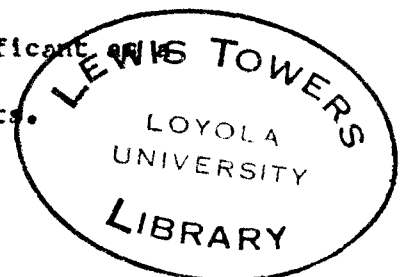
Thus, the multiple regression analysis has shown that neither extraversion nor its interaction with AI is related to the sum of the Guilford measures; however, for the Chapin test SI can partially be described as a linear relationship of AI together with the interaction between AI and extraversion. Cattell's proposal for the shaping or the possession of SI thereby is supported for the Chapin test. While only a small amount of the variability in SI_C (11.4%) has been accounted for in the above analysis, this finding does seem to indicate that SI research may profitably turn to the investigation of other personality variables and interactions to be included in the regression equation in order to investigate SI. Again, the hypothesis that the CSIT would show a higher correlation with AI than the SFTSI was disproven. The regression analysis has shown that AI is the best predictor for the sum of the

SFTSI, but that for the CSIT, even though it is more verbal in appearance, other correlates along with AI or verbal intelligence have to be considered.

Conclusions

The following conclusions seem warranted:

- (1) SI does not seem to be an ability independent of or distinct from AI. This conclusion seems warranted on the basis of the three different analyses.
 - (A) In the correlational data, significant correlations were found between AI and SI as measured by the CSIT and SI as measured by three of the SFTSI and by the composite of the four tests. Only Expression Grouping was found not to correlate significantly with AI.
 - (B) In the factor analysis, an intelligence factor emerged defined by both abstract and social intelligence. The factor that more closely resembled a social intelligence factor seemed to be differentiating test format, a pictorial vs. a verbal test format, rather than defining a separate SI factor. In the factor analytic data, the variables did not cluster into two distinct and independent factors that could be labelled as a verbal intelligence factor and a separate social intelligence factor.
 - (C) In the regression analysis, AI, either alone or interacting with extraversion, was found to be significant as a predictor variable of SI for both SI tests.



- (2) On the basis of the correlational and regression data, the SFTSI seems to measure a more verbal intelligence than the CSIT. The Guilford measures correlate slightly higher than the Chapin test with AI. Verbal intelligence or AI was found to be the best predictor variable for SI as measured by the sum of the SFTSI; for the CSIT, SI was predicted best by verbal intelligence plus its interaction with another correlate -- extraversion.
- (3) Cattell's hypothesis for the shaping or the possession of SI was supported for one of the SI measures used, namely, the Chapin test. For the CSIT, SI seems to be the result of the interaction between AI or verbal intelligence with the personality trait of extraversion. This did not hold for SI as measured by the sum of the Guilford tests.

CHAPTER V

CONSIDERATIONS FOR FUTURE RESEARCH

Reflecting on what has been done previously and what was found in this study, the following considerations are offered for future research in the area of SI.

A measure of AI that is more commensurate with the student-sample's ability might be employed. The large difference between the means and standard deviations that were reported by Terman (1956) and that were obtained by the subjects in this study indicated that the Terman Concept Mastery Test might not be adequately measuring the AI of the subjects of this study, but only tapping the upper limits of intelligence. The Terman Concept Mastery Test (Form T) was devised to retest the Stanford gifted subjects (30 years after the original testing on Form A) and their spouses. The gifted subjects showed a mean of 136.7 with a standard deviation of 28.5; their spouses, a mean of 95.3 with a standard deviation of 42.7. The group of undergraduate students that were tested and reported by Terman (1956) showed a mean of 101.7 with a standard deviation of 33.0. The greater majority of the means reported by Terman were above 100. The lowest mean reported was 60.1 with a standard deviation of 31.7 for Air Force Captains. The subjects in this study on the Terman Concept Mastery Test showed a mean of 48.35 with a standard deviation of 24.57. Also there were two subjects who obtained a negative score on the Terman Concept Mastery Test. There seemed to be no justification, however, for discarding their data on the basis of these

negative scores. Thus, the Terman Concept Mastery Test seems to be a measure of the upper limits of AI. The subjects of this study did not fall within these upper limits, and so it is questioned whether the scores they obtained on the Terman Concept Mastery Test are a true measure of their AI.

Additional personality variables, besides extraversion, might be investigated in order to determine their possible influence in the shaping of SI. Since AI has consistently been found to correlate significantly with SI, Cattell's line of reasoning about SI might profitably be followed in research, i.e., that SI is shaped by the interaction of AI and other correlates or "personality-temperament endowments." The personality trait of extraversion, which he hypothesized as related to SI, was found significant in its interaction with AI for the CSIT. Other personality variables or traits and their interaction with AI need to be researched in order to further investigate or extend Cattell's theorizing for the explanation and prediction of SI. Variables such as self-concept, self-esteem or assertiveness might be worth investigating in this context.

Finally, the possibility that test format might influence the measurement of SI and the construction of tests of SI needs to be considered. Test format, i.e., pictorial as opposed to verbal, seemed to define Factor VI in the factor analysis of this study. One of the criticisms of SI tests mentioned previously in this paper was the question of the usefulness of measuring relational personality variables by static, pencil-and-paper and verbal type tests. Possibly new

measures of SI that go beyond the pencil-and-paper, verbal type tests need to be constructed and which take into consideration a consistent test format. At present, further research could be turned to determining the possible influence of test format on the present measures of SI.

CHAPTER VI

SUMMARY

This study has attempted to further search in SI by looking at a possibly different approach to the understanding and the prediction of SI. Thorndike in 1920 posited that SI was a separate type of intelligence, distinct from abstract intelligence. Subsequent theorizing and measures of SI tended to regard SI as an ability separate from and independent of AI. However, research in the area of SI has not supported this contention for a significant and positive correlation has consistently been found between AI and SI.

As the first part of this study the relationship between AI and SI was again tested by 45 male and 30 female undergraduate students, who were given measures of AI and SI. Two measures of SI were used: four tests of the Six Factor Test of Social Intelligence (SFTSI), namely, Social Translations, Missing Cartoons, Cartoon Predictions, and Expression Grouping. These four tests, based on the Guilford SOI model, have been used in most of the research on SI. The second SI measure was the Chapin Social Insight Test (CSIT), which has received less attention in SI research. It was hypothesized that a significant correlation would be found between AI, as measured by the Terman Concept Mastery Test, and SI, as measured by both SI tests. This hypothesis was confirmed in all instances except for Expression Grouping of the SFTSI. This finding added further evidence for questioning the construct validity of SI as measured by these two SI tests.

The scores on these tests along with the subject's scores on the

Time and Support scales of the Personal Orientation Inventory (POI), extraversion and neuroticism from the Maudsley Personality Inventory, and demographic variables of age, sex, height and weight, and ratings on physical attractiveness were submitted to a factor analysis, which yielded six factors. Factor I, on which POI-time competent loaded positively and POI-time incompetent and neuroticism loaded negatively, was identified as an adjustment factor. Factor II was a sex factor on which sex, height and weight loaded above .30. Factor III formed an intelligence factor on which abstract and social intelligence loaded together. The only SI test which did not load on this factor was Expression Grouping. Factor IV, on which both ratings of physical attractiveness loaded, was labelled as a physical attractiveness factor. On Factor V, POI-other-directed loaded positively and POI-inner-directed loaded negatively, and this clustering was identified as an inner- vs. other-directed factor. Finally, Factor VI might possibly have been considered a social intelligence factor; Expression Grouping loaded very heavily and Missing Cartoons and Cartoon Predictions loaded also. However, the better explanation for this factor seemed to be test format because the SI tests which shared a pictorial format loaded on this factor, whereas Social Translations and the CSIT, which were totally verbal in content, did not load on this factor.

The intercorrelations of the six factors showed that Factors I and V, and Factors III and VI each seemed to be defining a similar area. It was concluded that the clustering of all the variables was summarized best by four distinct factors: a personal orientation factor, a sex factor,

an abstract and social intelligence-test format factor, and a physical attractiveness factor.

A different approach to the investigation of SI has been proposed by R. B. Cattell. For him, the relationship between AI and SI ought to be significant and positive because SI is not an ability distinct from AI, but rather is the result of the interaction between AI and certain personality traits, specifically in this theorizing, extraversion, which he labelled "F factor." Given the consistent correlation that has been found between AI and SI, Cattell's hypothesis offered a good framework in which to further investigate SI.

To test Cattell's proposal, it was hypothesized that there would be a positive and significant correlation not only between SI and AI but between SI and the interaction of AI and extraversion, as measured by the Maudsley Personality Inventory. A multiple regression technique was employed to test this in which SI was the criterion variable and AI, F, and $AI \times F$ were the predictor variables. The regression analysis indicated that for the sum of the Guilford measures (SFTSI), AI correlated significantly with SI; for the Chapin test (CSIT) AI together with the interaction between AI and extraversion ($AI \times F$) showed a positive and significant correlation with SI. Thus, the hypothesis was confirmed for one of the measures of SI, namely, the CSIT. This finding pointed to a possible direction that research in SI might take, namely, the investigation of personality traits or variables and their interaction with AI in the shaping of SI.

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APPENDIX I

Means and Standard Deviations for Males and Females

Obtained on the Ability and Personality Variables

	Males		Females	
	(N=45)		(N=30)	
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>
Chapin Social Insight Test	19.64	5.65	20.63	4.60
Social Translations	17.62	2.47	19.28	2.14
Cartoon Predictions	23.76	2.35	24.48	3.08
Missing Cartoons	18.41	3.80	18.65	4.58
Expression Grouping	19.24	3.04	19.59	2.98
Concept Mastery Test	48.00	23.86	48.88	26.01
Maudsley - Extraversion	28.87	9.73	30.03	7.75
Maudsley - Neuroticism	25.78	10.75	25.50	8.29
POI - Time Incompetent	7.38	3.37	5.33	2.04
POI - Time Competent	15.29	5.41	16.97	2.55
POI - Other-Directed	43.18	10.99	40.33	8.35
POI - Inner-Directed	81.73	10.22	82.23	8.60

APPROVAL SHEET

The thesis submitted by Eric Michael Gerdeman has been read and approved by members of the Department of Psychology.

The final copies have been examined by the director of the thesis and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the thesis is now given final approval with reference to content and form.

The thesis is therefore accepted in partial fulfillment of the requirements for the degree of Master of Science.

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DATE

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ADVISOR'S SIGNATURE